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The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo features a De Brazza's Monkey (*Cercopithecus neglectus*) submitted by Andrew Schaak. De Brazza's monkeys live in small groups in forests through Africa. They forage in the forest understory and floor, using long limbs and tails to move from tree to tree. De Brazza's monkeys are sociable among themselves but hostile towards other primates. The one exception is colobus monkeys, with which they coexist peacefully, perhaps because they don't typically compete for food. When threatened, they successfully hide by curling into a ball with their white parts hidden.

In some localized areas De Brazza's monkeys are disappearing as people destroy forest to make wood or farmland. On a broader scale, because they are so well camouflaged we don't know whether populations are declining, stable, or on the increase.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

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The exceptional work of these Committees and Programs is admirable and the teams can always use new members to fill roles and bring new ideas to the table.

Dedicated to professional animal care, the vision of AAZK is to provide resources for zookeepers and animal care professionals. AAZK seeks to cultivate quality animal care by making available the latest techniques and resources in animal husbandry and management and by recognizing the efforts of groups and individuals for excellence in advancing the animal keeping profession and promoting conservation efforts. Our Committees and Programs are designed to further this vision.

AAZK's Committees and Programs are comprised of volunteers from our membership and collaborate via e-mail and monthly virtual meetings in the creation of resources. All of the teams are led by a Chair and Vice Chair who lead the meetings, coordinate projects, and report updates to the AAZK Board of Directors. The members of the teams create the exceptional resources that AAZK offers to all of the Association members around the globe.

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- National Zoo Keeper Week Program

The exceptional work of these Committees and Programs is admirable and the teams can always use new members to fill roles and bring new ideas to the table. If you are interested in learning more about AAZK Committees and Programs, then visit the AAZK website. And keep your eyes on social media and the *Animal Keepers' Forum* for posted openings so you can join one of AAZK's incredible Committees and Programs.

Cheers,

A handwritten signature in black ink, appearing to read "Paul B".

Paul Brandenburger, AAZK President
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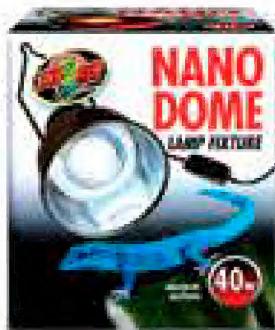
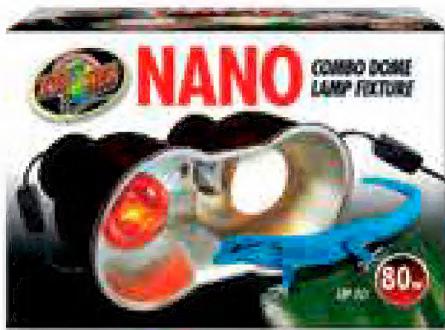


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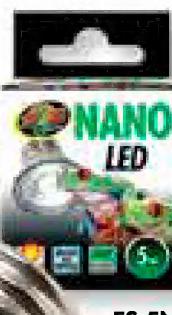
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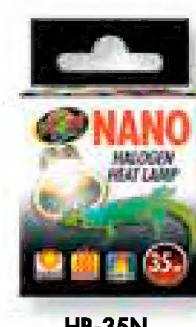
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Evolution in Zoos: An examination of evolutionary processes at work in zoos

*Sarah K. Bender, Student
Miami University*

ABSTRACT

Zoos' missions have evolved from being entertainment hubs to wildlife conservation meccas. A modern role of the zoo animal is to act as the bridge between humans and wild animals. Zoos however, does not always provide these animals the ability to act on their natural instincts. Over time, zoo animals breed with other zoo animals and produce offspring that are more adapted to a zoo environment. Additionally, zoo animal populations are small, making them more susceptible to genetic drift and decreasing genetic diversity. The potential for microevolution should be kept in mind when managing zoo populations and making breeding recommendations. Furthermore, this may have implications for wildlife conservation as zoo-bred and raised animals may not be genetically suitable for reintroduction into the wild.

INTRODUCTION

Living in zoos and aquariums is a vastly different lifestyle for an animal than their natural state in the wild. Animals live in smaller areas, with both natural and artificial habitat items, and most of their needs are taken care of in terms of feeding, rearing offspring, and medical care. In addition, animals that are typically prey do not have direct predators in a zoo or aquarium that they need to be cognizant of. Similarly, predators seldom have to

hunt for their food in a zoo setting. Zoos and aquariums also provide other non-natural stimulation for animals. These could include human interactions and differing weather patterns from what they would experience in their natural habitats. One might wonder what impacts the zoo environment has on these animals, specifically how they are changing over time and through generations as species, since selective pressures in a zoo are different than those in wild settings.

DISCUSSION

Biological evolution is a summation of random events, like mutation and sexual recombination, and non-random events, like natural selection, that lead to changes in heritable traits in a population or species over time. These changes can result in the formation of new species (macroevolution) or smaller changes that result in local adaptations in populations (microevolution). All animal populations, whether wild or in zoos, are subject to evolutionary forces (Schulte-Hostedde, 2015). While evolution in natural populations is widely studied, there is a lack of information on evolutionary changes in zoo animals. Because it is poorly studied, it is poorly understood which may impact the sustainability of the species and the implications on conservation of biodiversity.

A wild animal can be defined as a non-domesticated animal living in a free setting derived from naturally-evolved species or subspecies (Mason et al., 2013). In contrast, animals in zoos have been removed from their natural, free state and put into artificial environments. For the animal, zoos offer a safe place to live, proper nutrition, protection from predators, and health-care. In turn, animals in zoos are subject to limited habitats and interactions, which impacts natural ranging habits, modes of travel and social environments (Clubb & Mason, 2007). For example, in the wild, many animals only come in contact with mates during the proper mating time, however, animals in zoos may live in the same enclosure as potential mates, leading to behavioral issues like sexual aggression or incompatibility (Clubb & Mason, 2007). Captivity also introduces animals to atypical predators, pathogens and changes to their natural diet (Mason et al., 2013).

Because of this, zoo-bred animals will rapidly lose capabilities useful in the wild. According to Mason et al. (2013), rapid phenotypic changes occur in wild animals placed in zoos. Zoo animals often become more like domesticated animals over several generations, where they are likely to be less fearful, and their brain size decreases. These animals are

adapting to the artificial environment, and these behavior traits can be passed down to offspring, further enhancing the domestication of the species in zoos and distancing zoo individuals from their wild counterparts (Mason et al., 2013).

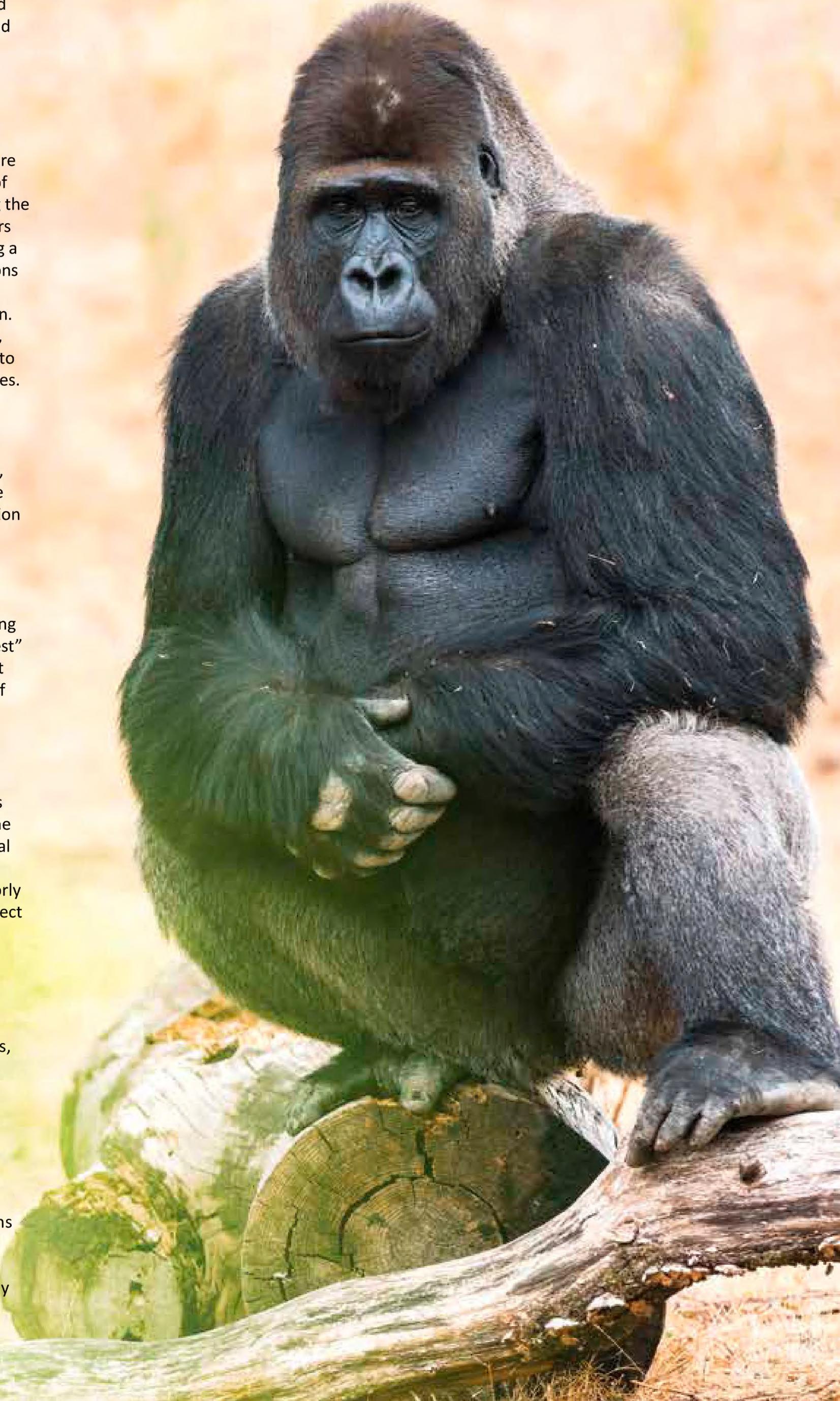
Animals in zoos are bred on a human-induced recommendation, which is a form of artificial selection. Additionally, the population sizes of species in zoos are small, so that there are only a handful of suitable mates for an animal, furthering the artificial selection process. Zoo managers do consider genetic lines while choosing a mate for an animal, but again, the options are limited and do not compare to the randomness of wild animal reproduction. Even with careful planning for breeding, it is easy for processes like genetic drift to cause random microevolutionary changes.

Animals that are less stressed or are more adapted to life in zoos have a higher likelihood of successful breeding, increasing the proportion of these more domestic-like individuals in the population (Mason et al., 2013). Finally, animals in zoos live for long periods of time due to the human care they receive and the protection from natural predators, thus natural selection is not at play eliminating weaker individuals. “Survival of the fittest” cannot be applied to zoos because most animals survive, putting the evolution of the population on a different trajectory than that of wild populations.

Because microevolutionary changes in behavior can happen over short periods of time, it is important to understand the long-term effects of zoo life on an animal population. Again, these evolutionary forces acting on animals in zoos are poorly understood, but could have a lasting effect on the sustainability of the populations (Schulte-Hostedde, 2015).

Phenotypic Plasticity

Zoo animals have been forced to adapt to their unnatural surroundings, and these animals can do so through phenotypic plasticity. Phenotypic plasticity leads to species matching the optimal phenotype for their environment, allowing the animal to cope in a zoo setting (McDougall et al., 2005). Because genes are passed down, this can lead to zoo populations with slight genetic differences than their wild counterparts. Over time, zoo populations have been genetically



adapted to have strong phenotypic plasticity to certain environments, like lessening stress in zoos, being adapted to human presence, and being able to adapt to unnatural weather conditions. Again, although zoos carefully manage phenotypes in zoo populations to match their wild counterparts, this can be extremely challenging due to the extreme differences in environment, which may have implications for populations over time.

Infertility Issues

Infertility is a common issue for zoo-bred animals. While the cause is still unclear, some possibilities include early removal from the mother or hand-rearing, unnatural social environments, and obesity. Additionally, the nature of the zoo environment may cause individuals to perform negative behaviors and this may impact reproductive success. The changes in natural seasonal and light cycles can also have an impact on some animals, as hormonal changes are tied to these cycles. Polar bears, for example, are adapted for lengthy periods of complete darkness or complete light, and the complete disruption of this natural habit could impact health and fertility of individuals (Schulte-Hostedde, 2015). An impact in fertility and health of animals in zoos would be detrimental to species population management and ensuring the diversity and continued conservation of vulnerable species.

Implications for Wildlife Conservation

Modern day zoos are switching their focus from providing animals for entertainment to using their resources to spread the message of the importance of wildlife conservation. According to AZA, reintroduction programs using animals raised or rehabilitated in AZA-accredited zoos or aquariums are powerful tools for revitalizing animal populations that have suffered serious declines in the wild (AZA, 2019). For example, the previously critically endangered golden lion tamarin was successfully reintroduced into the wild thanks to the efforts of the Smithsonian National Zoological Park and the Associação Mico-Leão-Dourado in Rio de Janeiro, Brazil (AZA, 2019).

Because many behavioral traits are

inherited, animals in zoo breeding programs may pass down unnatural traits to their offspring. This could have negative implications for any animal in a zoo breeding program that could be a candidate for reintroduction into the wild. For example, steelhead trout (*Oncorhynchus mykiss*) that are released after only a single generation in hatcheries have a significant reduction in reproductive success (Christie et al., 2012). Natural, sexual and artificial selection can cause shifts in temperament traits, which may impact the traits that are critical for successful reintroduction (McDougall et al., 2005).

Natural enrichment for captive animals

Providing enrichment for their animal is an important part of a zookeeper's job. There is a growing trend for zoos and aquariums to use mostly natural rather than artificial enrichment items, appropriately chosen for the specific animal species. These might include real vines for primate brachiation or hidden carcasses for large cat species. Enclosures and exhibits are also trending towards being more natural and larger, which benefits the animal but may also be due to visitor preference and demand. Providing natural exhibits and enrichment items can drive the expression of natural phenotypes, which may help keep zoo animals closer to their wild counterparts.

CONCLUSIONS

Despite zoos only being around for about 300 years, microevolution is certainly at work in zoos today. Over longer periods of time, genetic drift may play a role in distinguishing wild and zoo animal populations. Thankfully, zoos are taking the proper precautions to make sure that the evolutionary and behavioral ecology of zoo species is understood for the implementation of management plans. Still, unintended and unavoidable microevolution favoring adaptations for life in a zoo environment may still occur, despite the best efforts to prevent this from happening. Even so, awareness and vigilance of zoo animal microevolution can lead to zoos adapting care toward reducing speciation.

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Reintroducing Naked Mole-rats with a Hospital Chamber at Disney's Animal Kingdom®

Nick Milone and Tim Rudy, Trails Zookeepers

Disney's Animal Kingdom®

Lake Buena Vista, Florida, USA

INTRODUCTION

Naked mole-rats (*Heterocephalus glaber*) are one of many species of animals that live in large groups. They are most comfortable and most healthy living in a colony and have taken this to a different level by being eusocial, much like a bee or ant colony. They have one breeding female, the queen, with workers and soldiers working for her. Their hierarchy goes from the queen on top all the way down to the smallest, youngest pup.

In managed care situations, social animals sometimes need to be removed from their groups for various reasons. This is no different for the naked mole-rats (NMRs). Occasionally, NMRs injure each other establishing their place in the hierarchy. While other times individuals

may get sick or injure themselves and need to be medicated or closely observed. In all of these cases, an individual or small group may be better off if they are temporarily separated from the main colony. The challenge is getting them integrated back into the colony without losing their place in the hierarchy or being viewed as an outsider.

In 2005, some of the NMR keepers and zoological managers at Disney's Animal Kingdom® created hospital chambers that are divided from the main colonies. The purpose of the hospital chamber was to give animals in need of separation a safe place to get ready for reintroduction to the colony. Holding animals in a hospital chamber also allows the keepers easy access to these individuals for observation, wellness checks, and

medication without disturbing the whole colony. The hospital chamber is attached to the main colony with a PVC pipe that has a metal mesh divider preventing the animals from fully accessing each other. They are still able to smell each other, which is their primary method of identification due to their very poor vision. With our hospital chambers, NMRs can be removed from the colony and successfully returned to the group.

In addition to reintroducing individuals back to the group, we have found using the hospital chamber has allowed us to increase our reproductive success rate. Workers have been observed pushing, pulling and dragging the pups around so the queen and pups were placed into the hospital chamber to create a safer environment. Our reproductive success



(defined by having at least one pup survive a litter) is 11% when we don't intervene. When pulling newborn pups and the queen from the main colony, we have a 38% reproductive success rate. Removing pregnant queens, a week or less before giving birth, and placing them in the hospital chamber raises our reproductive success rate to 83%.

HOSPITAL CHAMBER SETUP

The two separate NMR colonies at Disney's Animal Kingdom® have numerous chambers that are connected through various shift doors and PVC pipes. The interior is covered in hydrostone, a brown textured concrete, to mimic their underground environment and give the NMRs traction.

So, what actually happens when one of the NMRs at Disney's Animal Kingdom® needs to be separated from the colony for any reason? First, the NMR needs to be accurately identified. All of the NMRs in our colonies are microchipped. Once the NMR is identified, it is placed in a hospital chamber (see Figure 1) to separate that individual from the colony. Since NMRs are eusocial mammals, they are never placed in the hospital chamber by themselves. They are always placed with two other individuals as companions. There is careful consideration of who the companions are, based on why that individual is in the hospital chamber.

The hospital chambers for the NMRs at Disney's Animal Kingdom® are a clear acrylic box 41 cm long, 23 cm wide, and 23 cm high with a hydrostone bottom. Each colony has a separate hospital chamber to ensure it has the scent of that particular colony. The front of the box is double-walled, separated by 3 cm. A 5 cm hole is cut through these front two walls and has a PVC bulkhead inserted through the outer wall. A piece of stainless steel mesh is inserted between the bulkhead and the inner wall. The mesh is the key to our success as it allows any member of the colony to interact with the individuals



Figure 1. Hospital Chamber - Photo by Nick Milone



Figure 2. Hospital Tank - Photo by Nick Milone

in the hospital chamber without physical contact.

The hospital chamber is connected to the colony by a piece of PVC pipe attached to the bulkhead in an adjacent exhibit chamber. Bedding and PVC pipe hiding spots are then placed in the hospital chamber. The bedding is determined by

the reason for the animal being removed from the colony. If there are no open wounds or no pups, Eco-Earth (a coconut fiber substrate) is used. If there are open wounds or pups, Eco-Bedding (shredded paper) is used. Once the wounds are healed or the pups are large enough, the Eco-Bedding substrate will be switched over to Eco-Earth. The exhibit animals

are housed on Eco-Earth, so this allows for the reintroduction process to begin. There is a small heat pad underneath the hospital chamber to give added warmth. The hospital chambers are always ready to house animals since everything needed for assembly, except the bedding, is stored together when not in use.

Since there are two colonies, each colony is cleaned every other day. The hospital companions are exchanged on that colony's normal cleaning day. The two companions which are in the hospital chamber are placed back in the colony and two individuals from the colony are placed into the hospital chamber. The two individuals which are being placed back into the colony are first locked into the bathroom chamber for approximately thirty minutes. This helps ensure that those individuals smell like their colony. Anytime an individual is placed into the hospital chamber or back into the colony, they are observed for a period of time to ensure that there is no aggression, which could occur immediately or days later. Once the separated NMR is within a week of being reintroduced to the colony, some substrate from the colony will be placed in the hospital chamber and vice versa. Changing companions and switching substrates allows for constant exchange of scents. These steps have led to successful reintroductions of individuals who have been out of the colony a period of time, some as long as five months.

There are several factors that go into the decision of which individuals are placed into the hospital chamber with the separated NMR. If the queen is in the hospital chamber with an illness and no pups, any individual from the colony can be placed with her. If the queen is in the hospital chamber with injuries and no pups, any non-soldier (defined as any individual under 45 grams) can be placed with her. This allows the queen to heal without the threat of a soldier being aggressive. If

the queen is in the hospital chamber with pups, only non-soldiers who are over 8-years-old are placed with her. This allows individuals with more experience assisting queens with newborn pups to help. If a non-queen is in the hospital chamber due to illness, any member of the colony except the queen can be placed in the hospital chamber. By allowing every individual in the hospital chamber but the queen, it helps maintain the order and structure of the colony. If a non-queen is in the hospital chamber with an injury, any non-soldier can be placed in the hospital chamber. This gives the injured NMR a chance to heal, eat, and gain its strength back.

How long an individual has been in the hospital chamber will determine how they are reintroduced, either a short or long reintroduction process. Our guidelines for determining which reintroduction process are dependent on status within the colony and length of time they have been out. If an individual is a queen or has been out of the colony longer than 3 weeks, the long reintroduction process is used. If a non-queen has been out of the colony less than 3 weeks, the short reintroduction process is used.

The short reintroduction process is fairly simple. The three individuals from the hospital chamber are placed by themselves into the bathroom chamber, which has been disconnected from the rest of the colony. They remain in there for approximately 30 minutes and are allowed to bathe in the feces/urine to gain the colonial scent before being reintroduced. The bathroom chamber is then connected to the rest of the colony to complete the reintroduction.

The long reintroduction process is more complex. The animals remain in the hospital chamber and two additional animals along with bedding from the colony are added when the colony is cleaned. Once there are eight individuals in the hospital chamber,

they are moved to a 20-gallon hospital tank (see Figure 2) that is connected to the colony with a PVC pipe that has a mesh divider installed. The process of adding two individuals to the hospital tank continues until approximately half of the colony is in the hospital tank. At that point, the mesh is removed so that the hospital tank and colony have access to each other. The colony is left with access to the hospital tank for a few hours so that each individual can leave the hospital tank on their own. Once there are no NMRs in the hospital tank, it is disconnected from the colony.

CASE STUDIES

We have used the hospital chamber on many occasions. Here are four cases using the hospital chamber that illustrate its diverse use.

Example 1

We decided to pull Simone, the queen in Colony A who had minimal reproductive success for eight years, to the hospital chamber a few days before she was going to give birth in hopes of increasing reproductive success. We used mammary gland development to determine that birth was close. She gave birth a few days later. On the day she gave birth there were no disturbances by keepers and for the next seven days the only time the hospital chamber was accessed was to give food. Two months later, we started with the long reintroduction process. There was no aggression or injuries after the reintroduction.

Example 2

After being introduced to the entire colony, one of our 3-month-old pups was seen limping. This pup was pulled out of the colony and placed in the hospital chamber. This individual was seen by the veterinarians and was diagnosed with insufficient bone growth in its elbow. This NMR was given medication and was left in the hospital chamber to allow the joint to heal. Approximately three weeks later, the limp had completely gone away and this NMR

and its companions were returned to the colony without incident using the short reintroduction process. The limp has not returned. Due to this elbow injury, this NMR was given the name LilElbowDude.

Example 3

When doing our normal checks of our colonies, a worker named Carmine was observed with a swollen nose and clear discharge coming from the nostrils. Carmine was seen by our veterinarians and was diagnosed with an upper respiratory illness. She received nebulization treatments twice a day for a few weeks to help treat the upper respiratory infection. Two other NMRs which had similar symptoms were also treated and held in the hospital chamber. Several weeks later, it was noted that there was an injury on one of Carmine's toes. This injury led to a toe amputation, which needed time to heal before she could be reintroduced. A few weeks after the toe amputation, the short reintroduction process was started based on her low standing in the colonial hierarchy. There were minor incidents of aggression directed towards Carmine, however there were no injuries or displacement.

Example 4

Joe was an average worker NMR in Colony A. He was removed from the

colony along with Cruella, an old spayed queen, and four other older NMRs, to create Colony C. After 11 years, Colony C was down to only two individuals, Joe and Ophelia. These two were having a difficult time keeping each other warm due to being poikilothermic, were less active, and overall appeared to be in need of a larger group. Colony C was located under Colony B, so dirt and debris from Colony B had fallen into Colony C's chambers for years. Due to this, Joe and Ophelia were introduced to Colony B using the long introduction process. Joe and Ophelia were allowed into Colony B with minor aggression initially. Unfortunately, Ophelia died as a result of aggression by the queen a few months later. Joe, however, has had no challenges.

CONCLUSION

In our 15 years of using a hospital chamber, we have successfully performed over 100 different NMR reintroductions. Some individuals have been out of the main colony for as long as five months, and successfully reintroduced. Out of all of our attempts, there have only been two incidents that resulted in serious injury or death. One female was severely injured during two separate reintroduction attempts, so she was permanently removed from this colony. One female, as mentioned previously, was indirectly killed a month

after being reintroduced. However, several NMRs with major to minor injuries and with various illnesses would not have been able to safely rejoin their colonies without using our hospital chambers. Without the hospital chambers, our colonies would be much smaller, and many animals would no longer be living within their groups. We think that the hospital chamber has been a great addition to our colonies and our husbandry. 

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American Association of Zoo Keepers, Inc.

Annual Report 2020

Dear Friends,

AAZK is once again pleased to offer our member partners a transparent view into AAZK through our 2020 Annual Report. Even during a global pandemic, AAZK continues to be at the forefront of animal welfare and continuing education for animal care professionals.

The *Animal Keepers' Forum* has been continually published in varying forms since 1968. Shane Good, the Editor of AKF, reports on the highlights of AKF in 2020.

Paul Brandenburger, AAZK President, reports on 2020 progress for AAZK Committees and Programs.

Bethany Bingham is the AAZK Director of Professional Development and Conference Management. Bethany will report on the postponement of the 2020 AAZK Conference and the revised housing for interactive resources on AAZK C.O.R.E.

Sara Bjerklie is now serving as oversight of the Conservation Committee that includes our two signature conservation programs. Thank you to all of our donors and Chapters who supported AAZK's Bowling for Rhinos and Trees for You and Me during the past year.

Ed Hansen

AAZK CEO/CFO

Questions regarding the AAZK Annual Report may be directed to Ed.Hansen@aazk.org.

\$492,839

AAZK Chapters' contribution to deserving groups and charities around the globe



28 AAZK Chapters donated
\$43,229 back to their Host Facilities

President's Message

The demands of operating AAZK during the COVID-19 pandemic necessitated growth and innovation in order to fulfill our mission. The cancellation of the 2020 AAZK National Conference was an especially devastating development. The Conference serves as a chance to connect professionals, provide learning opportunities, and engage with the membership. However, the work of AAZK and the membership was exemplary in adapting these opportunities to new formats.

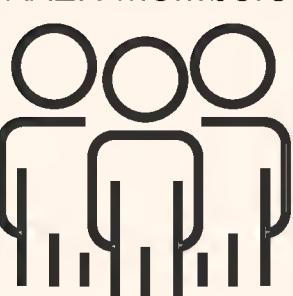
In the absence of a typical Conference, virtual events were created in order to recognize the work of animal professionals at a time when uplifting news was greatly needed. Resources were produced and altered to include tips on fundraising virtually. Distance-learning opportunities were presented and shared by AAZK and Chapters across the country. Members provided support to one another as many facilities dealt with closures and layoffs in the face of financial hardships. This is just a snapshot of the great work of AAZK in the face of the pandemic and it will lead to a stronger and more resilient Association as we move to a brighter tomorrow.

Paul Brandenburger

AAZK President

1727

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117

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2 **Bowling for Rhinos**
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*Funds received after 2019 Deadline

**2018/2019/2020 Events

Animal Keepers' Forum

The *Animal Keepers' Forum* continues to be the main communication tool for members, sponsors and advertisers. The monthly journal shares quality articles submitted by our members and supporters through features such as Training Tales, Enrichment Options and Conservation Station. The *AKF* highlights best practices and innovations in animal care, conservation success stories, plus training and enrichment ideas. Animal care professionals share and learn from experiences shared by their colleagues, and we are always interested in hearing from you. If you have comments for the Editor or would like to submit an article or cover photo— please e-mail Shane.Good@aazk.org.

» **Shane Good**, Editor

» Elizabeth Thibodeaux, Graphic Designer

» *Enrichment Options Column Coordinators*: Stephanie Chandler, Beth Stark-Posta, Beth Ament-Briggs

» *Training Tales Column Coordinators*: Kim Kezer, Jay Pratte, Angela Binney

» *Conservation Station Column Coordinator*: Wendy Lenhart

» *Animal Welfare Column Coordinators*: Stephanie Chandler, Beth Stark-Posta, Beth Ament-Briggs

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AAZK recognizes our Chapter partners for their support of AAZK in 2020 via the 2021 Chapter Re-charter process and Committee/Program support.

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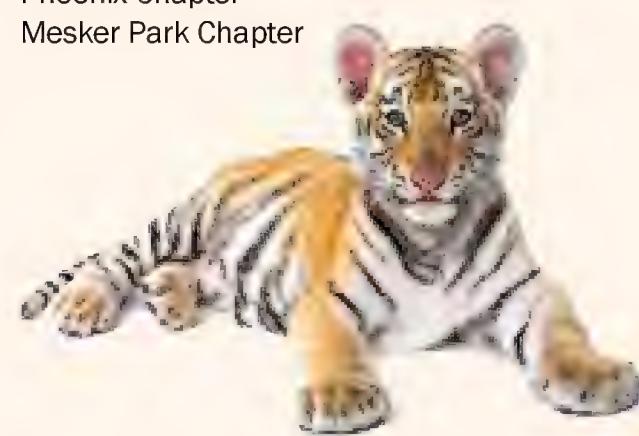
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Professional Development and Conference Management

During the summer of 2020, AAZK took the first steps to re-branding and relaunching our learning site, AAZK Online. This site was originally developed to connect members with professional resources and virtual courses on a variety of topics, in collaboration with the San Diego Zoo Global Academy. Access to the site is a membership benefit.

AAZK Online was refreshed by removing outdated information and adding a site navigation course, past conference proceedings and new personal professional resources. This was timely because of the pandemic and the effects on our members, and we wanted to offer resources that would support them during a time when they might unexpectedly need to update their CV or resume or look for new employment.

AAZK Online was re-branded to AAZK C.O.R.E. – Center for Online Resource Engagement. A marketing plan was developed

to introduce this new platform to the membership via e-mail, social media and the *Animal Keeper's Forum*. New courses were identified based on feedback from a membership survey and from current AAZK resource documents. AAZK C.O.R.E. will offer resources in three ways -

- >Educational documents such as conference proceedings
- >AAZK-created courses with videos and engaging narrative
- >Discussions - resources with opportunity for Q & A

Bethany Bingham

Director of Professional Development/Conference Management

Finances

EXPENSES 2020	
Association Memberships (AZA)	\$ 475.00
BFR Trip Winner Payout	\$ 6,750.00
Board Travel/Lodging	\$ 771.30
CEO Expenses/Travel/Lodging	\$ 935.30
Committee	\$ 2,768.21
Conference	\$ 10,042.71
Grants	\$ 10,150.04
Office	\$ 2,253.70
Office Rent	\$ 13,166.40
Payroll Fee	\$ 2,977.80
Payroll Taxes	\$ 24,571.53
Pension Contribution	\$ 4,164.00
Pension Management Fee	\$ 2,100.00
Postage and Delivery	\$ 1,796.12
Print and Production	\$ 395.00
Product Expense	\$ 509.53
Program Expense	\$ 1,500.00
Salaries and Wages	\$ 68,247.82
Staff Expense	\$ 764.05
AKF Postage and Delivery	\$ 20,680.53
AKF Printing	\$ 51,380.00
Insurance	\$ 886.00
Professional Legal Fees/Tax	2,545.00
Utilities	975.78
Web Revision and Management	2,037.47
Total Expenses	\$ 232,843.29

INCOME 2020	
BFR Registration Fee	\$ 1301.79
BFR Dedicated Program Income	
BFR CRG	\$ 4,349.37
BFR Trip Retention	\$ 6,750.00
Conference Income	\$.00
Donation	\$ 10,250.15
WC Insurance Refund	\$ 787.31
Non-member Job Posting	\$ 2,350.00
Membership	\$ 104,856.63
Product Sales	\$ 4,804.00
Re-charter Fee & Duty Obligation	\$ 68,525.14
Advertising	\$ 29,301.05
Tax/Utility Refunds	\$ 1,989.66
Total Income	\$ 235,265.10

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Category	December 31, 2020
Affiliate	342
Commercial	10
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Exchange	21
Institutional	133
International	31
Library	17
Lifetime	27
Professional	1309
Student	169
Total	2083

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Chimp Haven, Keithville, Louisiana*



Figure 1. Latoya

INTRODUCTION

Chimp Haven is a sanctuary for approximately 300 chimpanzees (*Pan troglodytes*) situated on 200 acres in Northwest Louisiana. The majority of the chimpanzees are retired from biomedical research. Positive reinforcement training (PRT) is critical to the management of the chimpanzees and has been a regular part of the husbandry routine since the first chimpanzees arrived in 2005. All animal care staff participate in the PRT program and can advance through five progressively more advanced levels. As part of training the chimpanzees using positive reinforcement techniques and daily routines, Chimp Haven's husbandry staff asks chimpanzees to move in the morning from their indoor bedrooms to their outdoor areas for cleaning purposes ("shifting"). Sometimes shifting can be difficult and individual chimpanzees may pose challenges for the staff. Creating a shifting plan for a chimpanzee may help with these challenges and is a requirement to advance in the training program. A shifting plan involves developing a set of consistent steps to encourage a chimpanzee to move outside each day. Latoya provides an example of the successful application of PRT in shifting chimpanzees.

BACKGROUND

Two caregivers are involved in asking the chimps to shift outside each morning. One person is spreading the diet into the feeding troughs attached to the outdoor area mesh and the other is manipulating doors. Out of the nearly 300 chimps in our care, there are naturally some that take more time or even refuse to shift – whether that be a one-time refusal or repeated non-compliance.

Latoya (figure 1 pictured on pg. 215) is a 30-year-old female chimpanzee and arrived at the sanctuary in 2016. Latoya was consistently non-compliant when asked to shift into her outdoor area. She currently lives in a group composed of

two males and five females and is high ranking within the social structure. Latoya has bright eyes, an aloof attitude, and a habit of stealing favored produce directly from her groupmates' hands.

As one of the husbandry staff assigned to her area, my desire to begin training with Latoya was borne from frustration with her non-compliance of allowing the doors to be closed during shifting. When we began feeding Latoya's group their morning produce, they would generally file outdoors with Latoya remaining behind. Regularly she would sit in the doorframe and not allow husbandry staff to close the shift door. Preferred foods such as bananas, juice, and novel fruits or enrichment items were not enough for Latoya to leave the door. Due to the position of the door and our ability to access her, she would frequently lean towards the item offered but leave a foot – sometimes even just a few toes – in the doorway, preventing us from shutting the door. Any attempt to close the door before she had a chance to position herself in it would lead to pilo-erect displays and sometimes mouthfuls of water spit in the shifter's direction.

Latoya's behavior would derail the shifting of her entire group as well. She would allow group members back inside after they gathered their portion of food or she would prevent those lower ranking from feeling comfortable enough to push past her and join the group outside for the feeding or the morning produce. Furthermore, Latoya's holding of the doors would regularly affect the husbandry routine. Without the ability to close the door behind her, one or more of her bedrooms could not be accessed for cleaning each day or a large portion of the caregiver's time would be used trying to convince Latoya to leave the door.

Our approach changed to ignoring Latoya's uncooperative behavior and simply asking Latoya to shift side to side between bedrooms. This yielded similar

results – sitting in the doorway between bedrooms. Latoya did eventually leave the doorway each day but only when it was clear that the caregivers had completely left the area. Latoya's motivation was unclear. She did not seem to dislike or fear her yard space or group members because she would spend time outdoors and interacting with groupmates when caregivers were not asking her to shift or actively cleaning in the area. This created a stressful and time-consuming shifting experience for everyone.

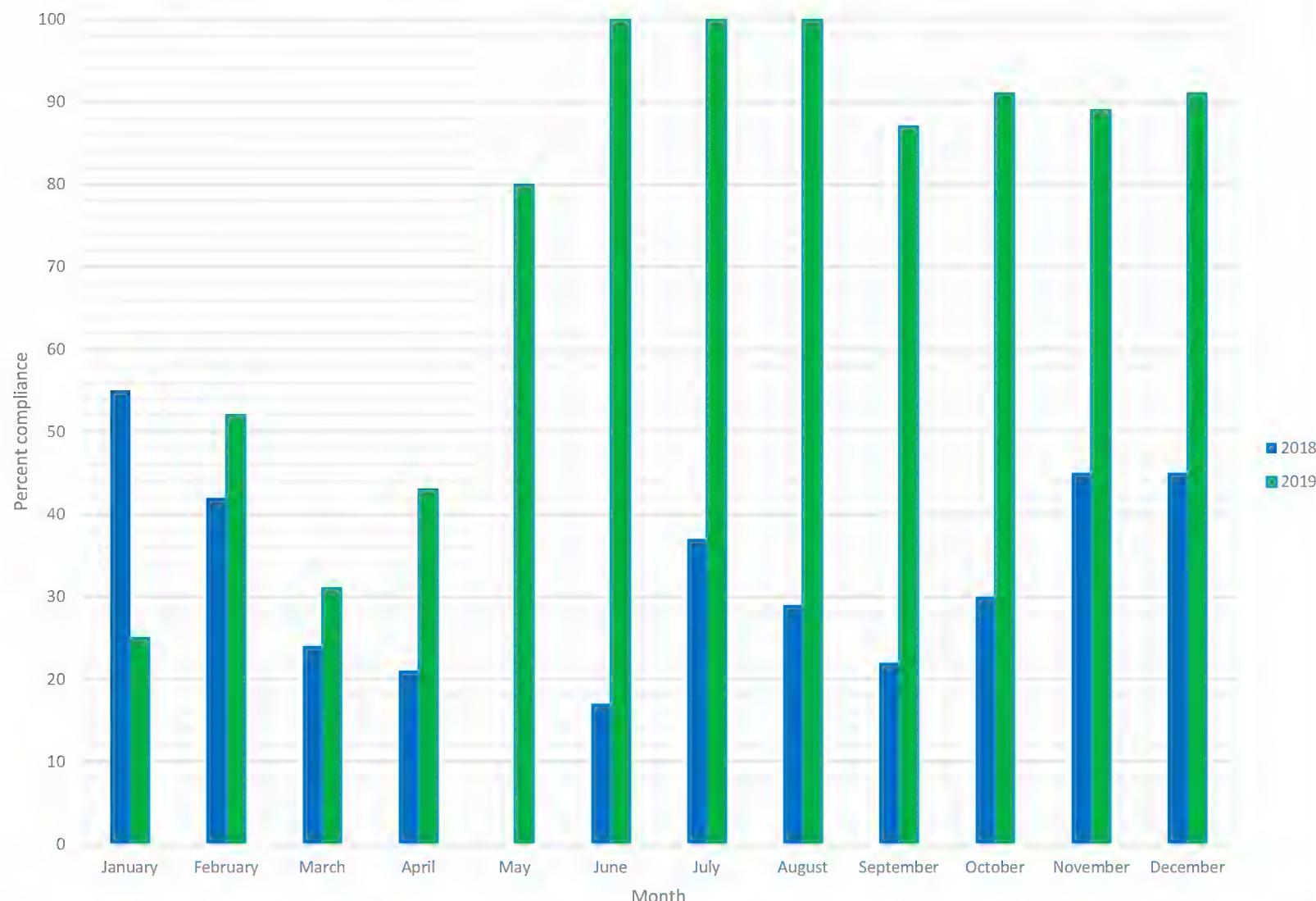
CREATING A SOLUTION

I began drafting a shifting plan for Latoya in the spring of 2018. The goal was to get her away from the shift doors long enough for someone to shut them and for her to allow them to do so. This would have the added benefit of the process being less stressful for both Latoya and the staff involved. I knew that engaging Latoya with something else would shift focus away from the doors. This is where positive reinforcement training came into play.

Latoya had a previous positive reinforcement trainer at Chimp Haven that did a wonderful job teaching her many behaviors relating to body presentation and even stethoscope training. From consulting with her previous trainer, I knew that Latoya was an eager training participant. She prefers grapes or grape flavored things as a reward and did not respond to excessive verbal praise (ex: loudly proclaiming "Good job!") and would occasionally even leave training sessions when her trainer seemed too excited.

One of the positive reinforcement behaviors we work on at Chimp Haven is "target" which is where a chimpanzee is asked to touch (and not grab, swipe or hit) the top of a PVC pipe with a cap on the end that prevents it from being pulled completely through the mesh. The PVC pipe is about 12 inches long and the capped end is 1.25 or 1.5 inches in size depending on the size of

Figure 4. Latoya shifting compliance over 2018 and 2019. Percentage of days by month.



the mesh where it is being used. Latoya was already proficient at the “target” behavior, which I sought to utilize when creating my plan and ended up slightly modifying “target” into “station.” When asking a chimpanzee to “station” we are asking them to remain in one specific location, usually while continuing to train or target, until released with a cue. In this case, I used “all done” to let Latoya know she was free to break station. I wanted Latoya to meet me at a spot during shifting that was close enough to the doors that she knew what was going on and was not being tricked, but far enough away that she could not simultaneously station and hold the door.

IMPLEMENTATION

In the first draft of the plan, implemented in May of 2018, the station started as a plastic plate on a carabiner. Since it was a newer item for Latoya, I placed a small dot of peanut butter on the plate to encourage her to interact with it and to desensitize her to its presence. I hung the

plate on the mesh of the yard away from the door and asked Latoya to station, while I was poised behind the plate waiting for her to join me in front of it. At first, the entire process involved three caregivers: myself (with Latoya), one to feed her groupmates and another to shut the doors.

Ideally, Latoya would leave the doorway to sit in front of the plate and hold onto it while the shifter calmly closed the door and announced they were doing so. My role was to bridge Latoya, or let her know that she was performing the right behavior with a click or subtle praise for holding. I rewarded her very sparingly (due to her habit of accepting larger rewards and then getting back in the doorway) until the door was closed. At that point, she would receive her daily banana and a squirt of juice.

We had to establish the “hold” behavior while operating the plan, which involved a series of progressive steps to get

Latoya to stay at the station by holding the plate. Latoya was initially rewarded for interacting with the plate, then just touching it, followed by grasping onto it. I would repeat the word “hold” every few seconds and then bridge for continued contact. Knowing that Latoya seemed deterred by excessive praise, I calmly inserted the word “good” in between continuing to ask for “hold” to let her know she was on the right track before bridging.

Another key element to the plan was imposing a time limit. In the past, caregivers would spend nearly the entire duration of the husbandry routine (about an hour) trying to get bedrooms from Latoya. This would delay the cleaning routine and shifting of other groups. Going forward, I wanted to give Latoya two or three minutes to come outside and then redirect to ask her to station at the front of her bedroom to be locked inside. If Latoya still did not leave the doorway to come in, we would end the session and

stop asking her to go in or out and allow her to remain in the doorway.

In late June of 2018, one month after the plan was implemented, Latoya followed the plan for the first time and allowed staff to close the doors behind her while she remained at her station, which was a significant first step. Despite this success, we did experience some setbacks in the first few months. Latoya still only complied 17% of the time in June of 2018. She also became possessive of the plate when it was hanging on the mesh and would not let staff retrieve it until later in the day. We did not want the plate to remain hanging on her yard space or bedrooms for fear of it losing its novelty or for its presence to be associated with anything but Latoya's shifting plan.

In an effort to interact with Latoya outside of shifting and maintain her previous positive reinforcement training, I began joining her for sessions in the afternoons. In these training sessions, we focused on body presentation and did not manipulate any doors. True to her previous trainer's word, she was an eager participant. Over time, I began to see more of Latoya's personality during these training sessions. This translated to different behaviors during shifting too. She even began to greet me with panting and games of chase before assuming her position in the doorway during shifting.

Over time, due to Latoya's possessive behavior towards the plate, the shifting plan was modified to its current form. As of February 2019, the plan dropped to two staff members: one shifting and stationing and the other feeding. We also removed the hanging plate from the plan and instead opted for the PVC pipe we use for targeting, mentioned earlier. Because this PVC pipe target allowed one end to go through the mesh but not the other, it gave Latoya more agency to manipulate and hold the target. The hold behavior became her maintaining continuous contact with the target when

cued to "hold" or grasping the PVC pipe completely. She picked up on this switch very quickly.

RESULTS & DISCUSSION

Despite some brief and sporadic periods of regression, Latoya has been consistently following her shifting plan since May of 2019. Our animal care team keeps logs detailing the shifting of each of our chimpanzee groups every day – if we ask them to go outdoors, come indoors, or move spaces. Using this information, I summed up the days that Latoya was asked to go outside and how many she actually allowed herself to be locked outdoors for all of 2018 and 2019, respectively, in order to compare her compliance and cooperation over time.

Latoya's shifting compliance was very low in 2018 (figure 4). In fact, in May of 2018, Latoya never allowed herself to be locked outside any of the times caregivers asked her. The data from 2018 does show relatively more success in the summer months, but even when the month included more sunny and mild days, Latoya was still rarely compliant in 2018. As previously stated, Latoya's compliance in 2019 started showing an uptick in May. In the months following, she has been compliant 80% of the time or more. It is possible in the

earlier months of 2019 that Latoya was refusing to shift more often because of lower temperatures, but her compliance later in 2019 in months with similar temperatures, is actually high. At Chimp Haven chimpanzees are rarely trained by someone other than their primary trainer but may be asked to shift train by multiple trainers. To create consistency for Latoya, as her primary trainer, I was the one asking Latoya to station the majority of days; especially early on in the plan's implementation. However, in December of 2019, Latoya was shifted by different trainers 75% of the days she was asked to shift outside, and she complied 91% of the time.

Latoya's plan has undergone temporary modifications as time has gone on due to her group moving yard spaces. At one point, Latoya lived in a space with three shift doors instead of the two she was used to. This required Latoya to station at a spot where she could not make it back to the door if she wanted to and she still complied 91% of the time she was shifted in that set up. Latoya's plan also had different applications. When moving yard spaces required Latoya to move through overhead chutes, she would frequently stay in the chutes and remain in them for a considerable amount of time without moving. Since

Figure 5: Latoya sitting in a doorway. Photo courtesy of Chimp Haven.



implementing the plan, Latoya has agreed to leave the chutes to station in her new space quickly and without displaying or spitting water once her access to the chute was removed.

Latoya's current success is largely due to regular training during and outside of shifting and giving her the opportunity to have control during the shifting process. Using the hold behavior, I was able to give Latoya the ability to have control during shifting. Knowing that she enjoyed training helped me to make the decision to incorporate that into my shifting plan. When I started training with Latoya more frequently, it was clear that she was very eager to please and willing to engage. From these sessions the relationship between Latoya and I strengthened. This is due to Latoya responding positively to undivided trainer attention. In the months that we have been operating the shifting plan, Latoya and I have progressed through the training program moving on to more advanced behaviors

related to medical care. We began temperature monitoring with a forehead thermometer and successfully revisited stethoscope training.

FUTURE PLANS

Ideally, Latoya would shift out all the time without having to station, and it is possible that one day she will get to that point. For now Latoya is comfortable shifting out for multiple caregivers following the stationing plan. While I do expect the occasional regression, I am hopeful Latoya has let go of her door holding habits and will continue to regularly station for caregivers each day.

ACKNOWLEDGEMENTS

I want to thank several people who were essential in helping me throughout the process of creating and implementing the plan. First and foremost, I want to thank Rebekah Lewis. Rebekah helped me to create and modify Latoya's shifting plan, as well as assisting me in writing and editing this paper. Next,

I would like to thank the caregivers and my supervisor Mark Lewis who shifted Latoya on days I was unable to and supported our team's universal desire to make shifting Latoya's group a smooth experience. I would also like to thank Leilani Beaupre and Amy Fultz for helping me greatly with drafting this paper. Finally, I want to thank Latoya's former trainer, Awbrea Moss, for establishing several behaviors with Latoya that were integral to the success of the training experiences I have with her now. 

The views and opinions expressed in this publication, presentation or abstract represent the authors' views alone, and do not express or imply the views, endorsement, or financial support of the Federal government or any of its agencies, including the National Institutes of Health, unless otherwise stated by an authorized representative thereof.

Training Tales Editor Comments by Kim Kezer

Consequences are events, stimuli or conditions that influence future occurrences of the behavior they immediately follow. Behavior is a function of consequences. Reinforcement provides a consequence that maintains or increases the behavior it follows (LLA Friedman). When reviewing this Tale, I immediately thought about motivation, reinforcement and how easily animals can quickly operationalize a behavior to produce positive consequences which do not align with the response we want.

Shifting animals is such a basic behavior but in fact it can be quite challenging for an animal to allow us to close a door behind them. I have seen too often where trainers inadvertently create a sticking point for an animal by giving a high rate of reinforcement for approximations at the transition point from one area to another. The animal begins to shift, they get reinforced before they have moved to the desired position, and the animal stops or steps back and the process is repeated, creating a strong reinforcement history in that area. To get beyond that sticking point, adjust the amount and type of food in certain areas. Less desirable food can be given near the threshold initially but very quickly fade that out and focus on high value reinforcement given at a high rate in the desired area.

Reinforcement comes in many forms, such as food, attention, tactile, cues and even positive experiences for you and your animal. A turning point in this Tale is when training sessions began to happen at times other than shifting. This helped to develop a strong, trusting relationship that created more positive outcomes for both the animal and the trainer. Quality training time created a high value scenario with higher positive consequences than the time spent together during shifting.

Thank you for sharing your Training Tale about a sometimes, frustrating routine behavior and your efforts in changing the outcomes.



by Abbie Doan

I'm Abbie Doan and I have had the privilege of serving as Board Oversight for the AAZK Communication Committee (Comm2) as well as the National Zoo Keeper Week Program (NZKW). I was sworn into the Board of Directors at the 2019 National Conference. I have been involved in my local AAZK Chapter, Indy AAZK, shortly after I started as a keeper at the Indianapolis Zoo in 2008. I hadn't had much involvement on the national AAZK level until our Chapter had already begun the process of planning to host a national conference. In 2016 I took on the Conference Chair position and this is when I made my connection to AAZK on the national level. Once I began engaging more closely with this community, I was hooked! When a Board of Directors position was posted as I neared the end of our conference planning, I knew I wasn't quite ready to give up my close involvement with AAZK, Inc. and decided to apply. I was in! Since then, I found myself learning a lot and I love this organization and the people involved in it.

As a member of the Board of Directors (BoD) I serve alongside three other BoD members in addition to two others who act as President and Vice President. We all work with the CEO of the organization, Ed Hansen. We meet monthly to discuss the

On Board with AAZK

Articles from the AAZK Board of Directors covering thoughts, news, and tales from the Association

direction of the organization and to vote on things like project proposals submitted by AAZK committees and programs. During the annual conference each year, we meet to approve the annual reports and budgets of each committee and program. Each of us also serves as Board Oversight to each of the committees and programs to help serve as liaison between the BoD and those teams.

I have been embraced by the committee and program that I help to serve where I have oversight duties. I can't overstate how much I admire and appreciate the individuals who serve on this committee and this program. They are volunteers who devote countless hours each week dedicated to advancing the mission of AAZK and they are incredible. I'd like to introduce you to these wonderful AAZK teams!

First, let's talk about the Communication Committee. These are the people you hear the most from since they tackle all things in regards to communication from the Association. Comm2 members are divvied up to teams within the committee and each team handles a different facet of communication- networking team, social media team, and Association information team.



We get many questions through our social media platforms or from visitors to the AAZK webpage. The topic of these inquiries are anywhere from questions about the Association to where the best information can be found on emu breeding. We also get a lot of questions from aspiring keepers hoping to get as much information as they can before embarking on their careers. Comm2 team members do a great job directing these people to the right information as best they can to help them on their way. They work so hard to make sure to help as much as possible for each person who reaches out!

AAZK's social media is a big part of what Comm2 tackles as well. Making sure to

share relevant information to our members in engaging ways is their expertise! When we aren't sharing the great work and outreach of the various committees and programs within AAZK, we make sure to engage our members and guests with posts that broaden knowledge or posts that simply inspire relevant conversations that can uplift and bring a smile.

Comm2 also manages the e-mail communication that goes out to our membership. Other committees and programs contact Comm2 to get their word out to the organization and the folks on this team bundle it up and send it out in a clear and eye-catching way to keep our members up to date. It's a big job but they always do an excellent job.

The Communication Committee made up of nine people including Joy Kotheimer and Tianna Redieck, who do an outstanding job leading their team. They serve as Chair and Vice-Chair and they are working round-the-clock to keep information moving through this committee and out to the organization. If you are someone who loves to get the word out about what AAZK is up to or you are passionate about helping out current and aspiring keepers, then Comm2 might be just the place for you! We would love to welcome more individuals onto our passionate and driven team. If you'd like more information, please contact Joy at communication@aazk.org.

Not only do I get to work with one group of incredible people, but I am so fortunate to also serve as Board Oversight for the National Zoo Keeper Week Program (NZKW). NZKW is one of the things that got me involved with AAZK in the first place. Indy AAZK does a great job reaching out to each department at our zoo to participate in the NZKW activities at my facility during that third week in July each year. That outreach is what got my attention! Giving animal care facilities and local AAZK Chapters tools to take part in National Zoo Keeper Week is what the folks on the NZKW team do each year. This is so much more than just a week to appreciate the hard work that keepers

do. National Zoo Keeper Week is actually an official House of Representatives Resolution that was introduced in 2007. The aim of this week is to recognize that zookeepers are educated individuals who are essential to the conservation work that zoos take part in. Zookeepers are not just fundamental for the highly specialized care of the animals but also for helping to facilitate research projects and public education; each of which are important facets of inspiring others to care for and protect wildlife.

This year, National Zoo Keeper Week occurs from July 18th-24th. With a theme of 'Improvise, Adapt, Persist: Keep on Zookeepin' On', we're highlighting the adaptability it takes to be a successful force in the zooquaria field. We will be touching on the internal and external hardships that ultimately come with the career at times while highlighting the camaraderie, the positives, the dreams and persistence so present in our field.

Each year at the completion of the current National Zoo Keeper Week, the individuals on this team are already hard at work planning for the following year. Coming up with a theme is only a small part of the planning process. The NZKW team is full of intensely creative individuals who are always brainstorming ways to keep ideas fresh to ensure that AAZK Chapters have

ways to engage staff at their own facilities. They create and adjust a planning packet that is posted on the AAZK website, that Chapter leaders can easily reference for ways to recognize the incredible work of their fellow keepers. This is hugely helpful especially since Mid-July is right in the middle of busy season for many facilities, so having the planning already laid out makes sure that Chapters don't need to stress due to lack of time to generate ideas for the week.

The planning packet includes things like printable cards to share kudos to your co-workers and printable graphics to share 'selfies' on social media to spread the word about National Zoo Keeper Week and the work that zoos and aquaria do to promote and take part in animal conservation efforts.

There are also lists of ideas of activities that individuals can pull from to do at their facility. One of my favorite activities that the NZKW team facilitates is the postcard exchange. Chapters who wish to participate can contact NZKW@aazk.org and the team will send them a snail mail address of another participating Chapter. Keepers can send each other well-wishes to arrive during NZKW. In a world gone digital, getting a little mail is kind of magical and can lift spirits during a busy time of year!



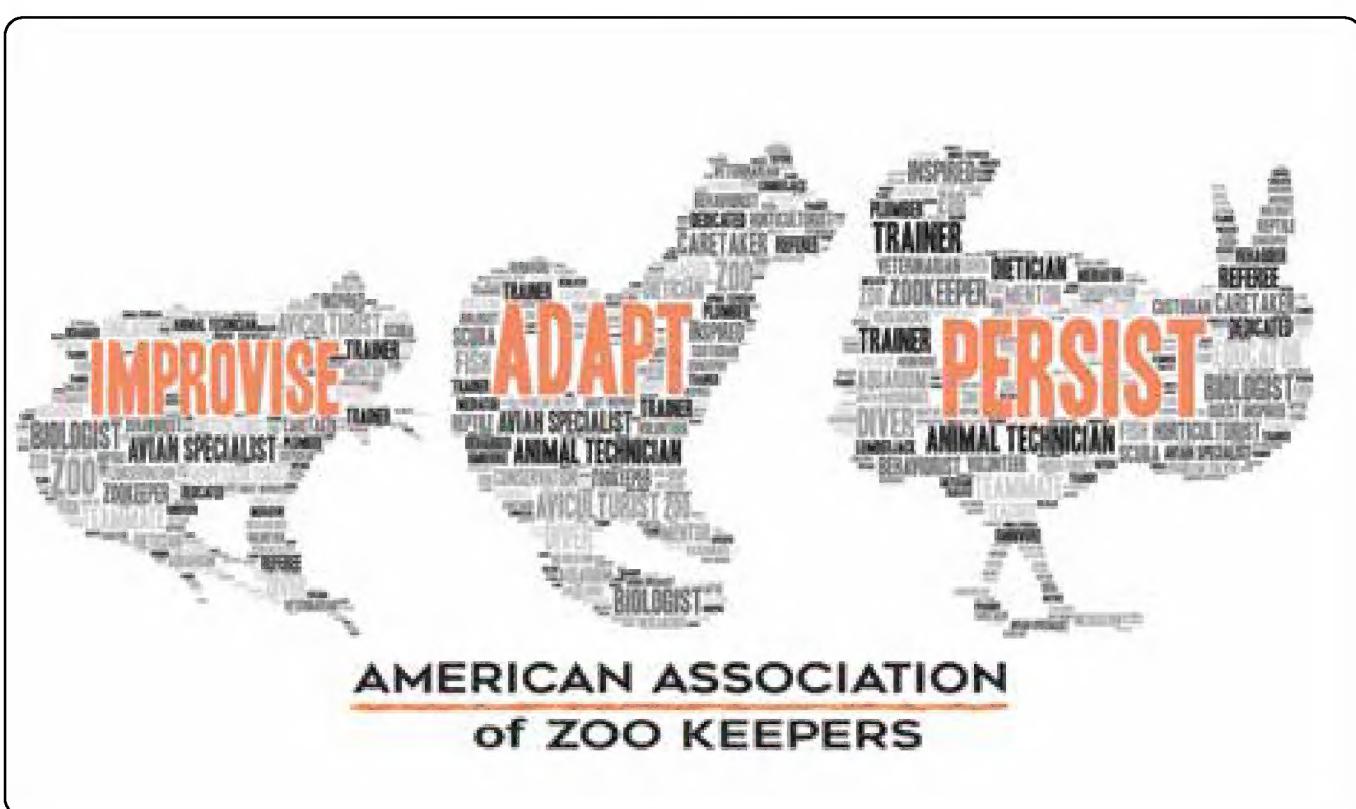
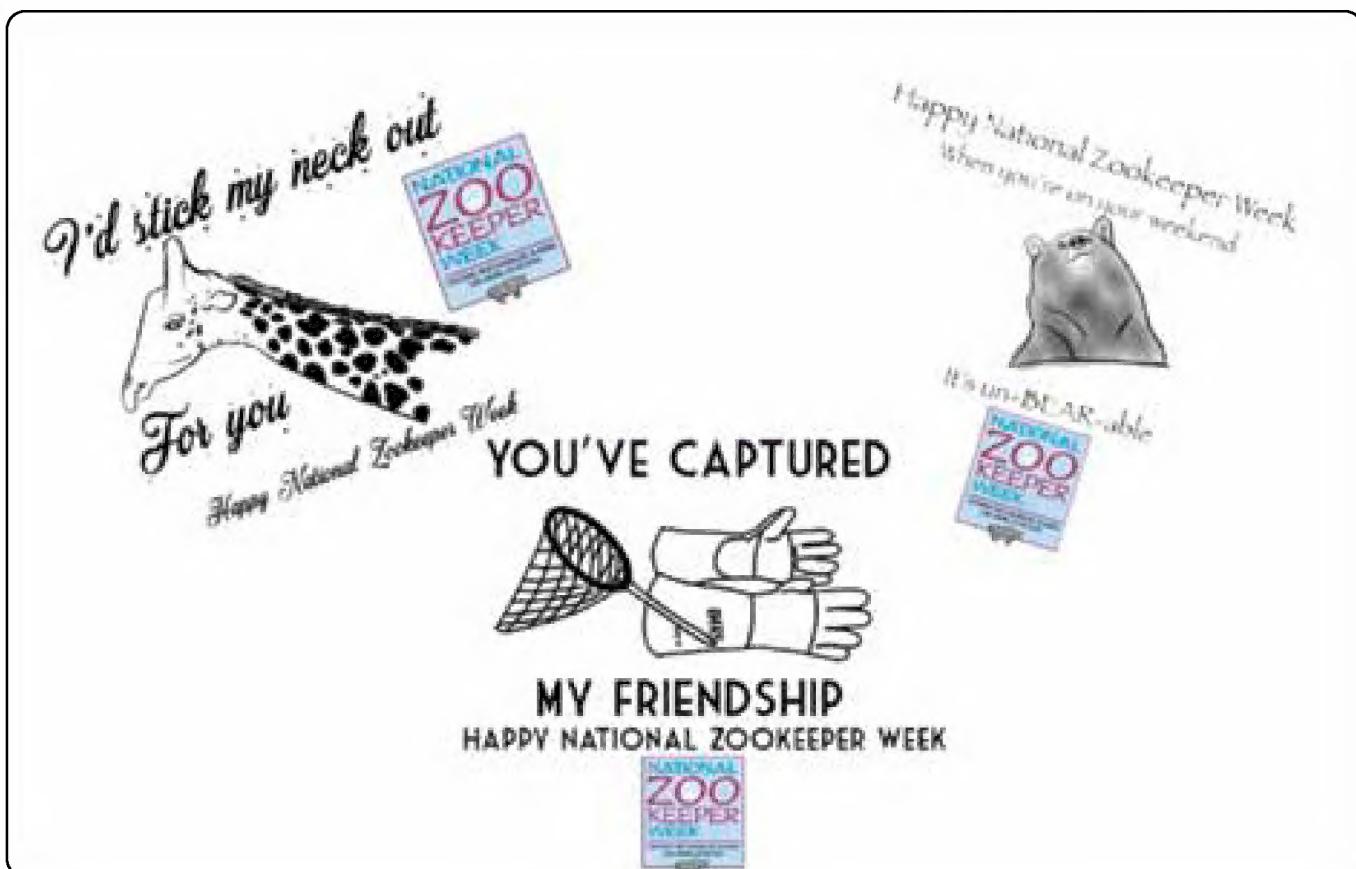
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While there is a week set aside to officially participate in NZKW, the sentiment can certainly be shared year-round. The NZKW team has done an awesome job creating word clouds that contain words and terms associated with being a zoo keeper that are organized into shapes of many of the different species that we all work with. These word clouds are really cool and also very eye-catching and get a lot of love on social media. Making them a really fun but effective way to share the integral role that zoo keepers have in the field of animal conservation and education.

This team is a small but mighty four individuals including leaders Jenna Schmidt and Alexandra Rose, who serve as Program Manager and Vice-Manager. They do a great job sharing their passion to inspire their team to do amazing things year after year. If you want to get involved, we are always looking to expand this creative and hardworking team. Contact Jenna at NZKW@aazk.org if you'd like more information!

This team is a small but mighty four individuals

Stay tuned to AKF for more *On Board with AAZK* in upcoming issues. While we will each give a glimpse into our corner of the organization I find that overall our experiences with AAZK are likely very similar. This organization is full of members who inspire one another not just with the incredible work they do every day but by embracing all who come to AAZK searching to learn more and expand their horizons. I find that we're constantly challenging one another to do better and our industry is moving forward as a result of our members spread across the continents! I encourage you to get as involved as you are able and consider joining one of the many committees and programs that AAZK is made of. I know I'm glad that I did. 



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